

W. WHALEY.
LOADING MACHINE.

APPLICATION FILED MAR. 21, 1908., RENEWED APR. 22, 1910.

976,711.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 5.

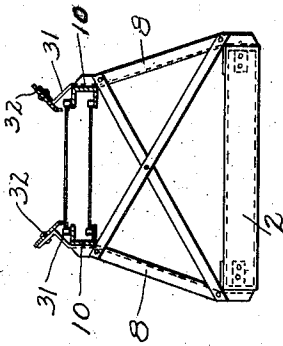


Fig. 1.

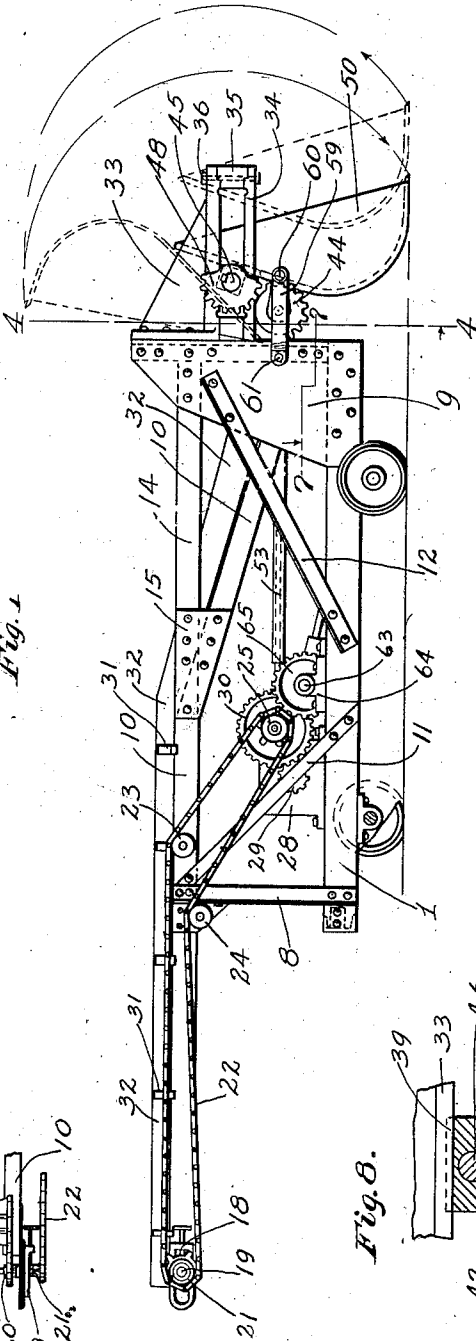


Fig. 4.

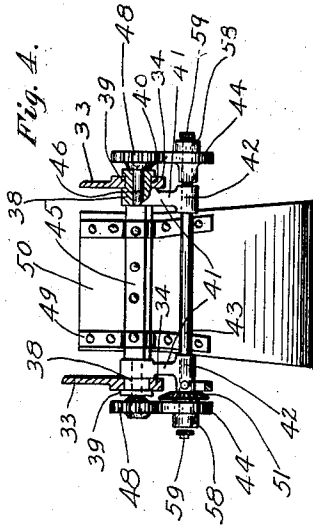


Fig. 6.

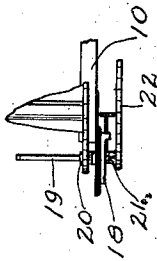
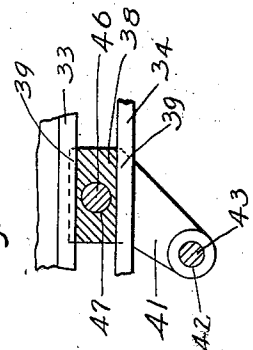


Fig. 8.



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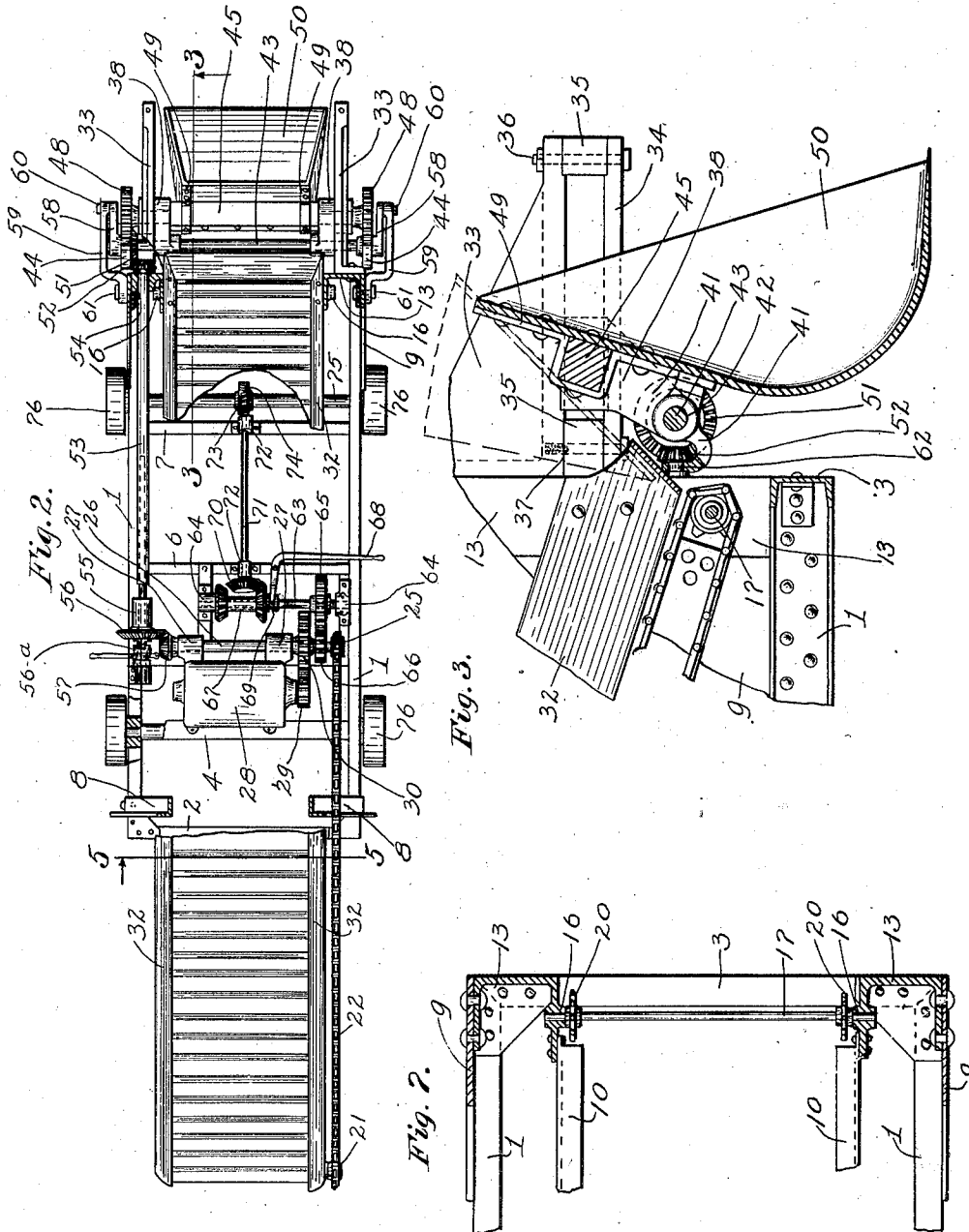
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2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM WHALEY, OF KNOXVILLE, TENNESSEE.

LOADING-MACHINE.

976,711.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed March 21, 1908, Serial No. 422,488. Renewed April 22, 1910. Serial No. 557,074.

To all whom it may concern:

Be it known that I, WILLIAM WHALEY, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Loading-Machines, of which the following is a specification, reference being had to the accompanying drawing.

My improvement relates particularly to mechanism for loading coal and other minerals in approximately horizontal mine workings in which the head room is so low that steam shovels and bucket elevators and similar machines can not be used. The machine is adapted to be used upon surfaces or tracks which are level or so nearly level as to permit the propulsion of the machine toward and from the material to be loaded. While the machine is primarily intended for use in such workings, it may also be used in open situations for the loading and digging of coal; ores, gravel, sand, earth, and other loose materials.

The improvement may be embodied in a variety of forms. In the particular form herein described, the invention is embodied in a machine comprising (1) a frame mounted upon supporting wheels for the moving of the machine to and from the material to be loaded; (2) an endless conveyer extending lengthwise of said frame and high enough at the rear end to discharge on a wagon, car or otherwise; (3) a shovel or scoop supported at the front end of said frame and so controlled as to move forward with its nose upon the floor or ground and take a load, lift the load and move it rearward and discharge it upon said conveyer.

Any suitable power is to be provided for operating the conveyer and the scoop or shovel. In the form illustrated by the drawings, an electric motor is mounted upon said frame to furnish such power.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus embodying my improvement; Fig. 2 is a plan of the same structure, portions being broken away; Fig. 3 is a longitudinal upright section on the line 3—3 of Fig. 2, looking in the direction of the arrow; Fig. 4 is a transverse upright section on the line 4—4 of Fig. 1, looking in the direction of the arrow; Fig. 5 is a section on the line 5—5 of Fig. 2, looking in the direction of the arrow; Fig. 6 is a detail plan of one of the rear corners of the rear

conveyer; Fig. 7 is a horizontal section on the line 7—7 of Fig. 1; Fig. 8 is a detail, upright section of the scoop-supporting mechanism.

Referring to said drawings, 1, 1 are lower side rails of the frame. The rear ends of said rails are connected by a cross-rail, 2, and the front ends of said rails are connected by a cross-rail, 3. Said rails are also connected by intermediate cross-rails, 4, 5, 6, and 7. From the rear end of each side rail rises a corner post, 8. Said posts are inclined toward each other (see Fig. 5). On the front end of each of said side rails is a plate-form corner post, 9. A brace, 11, extends from the upper end of each rear corner post, 8, obliquely downward and forward to the adjacent lower side rail, 1; and a similar brace, 12, extends from each corner post, 9, obliquely downward and rearward to the adjacent lower side rail, 1.

To the front portion of the inner face of each corner post, 9, is riveted or bolted an upright channel piece, 13. Above and parallel to each side rail, 1, is an upper side rail, 10, having its rear end secured to the adjacent corner post, 8, and having its forward end secured to the inner web of said channel piece, 13, said upper rails being nearer to each other than are said lower rails. And each upper side rail is secured to the channel piece, 13, only a little way above the front end of the lower side rail and extends thence obliquely upward and rearward and then forms an angle and extends rearward to the height of the rear corner post, 8, and extends thence rearward any desired distance beyond the rear corner post. From the angle in said upper side rail, a supplementary side rail, 14, extends forward horizontally to the inner web of said channel piece, 13, and is suitably secured thereto. And each such supplementary side rail, 14, is joined to the main upper side rail, 10, by means of a gusset plate, 15. Each upper side rail is of channel form, the flanges being turned inward to form ways for carrying the conveyer belt, as will be hereinafter described.

In line with each upper side rail is a bearing, 16, in said channel piece, 13, and a transverse horizontal shaft, 17, rests in said bearings. At the extreme rear end of each upper side rail, 10, is a bearing, 18, and a transverse shaft, 19, rests in said bearings. On said shafts, 17 and 19, are sprocket

wheels, 20. An endless conveyer belt surrounds said shafts and sprocket wheels and has its upper portion resting slidably upon the upper flanges of said channeled upper side rails, 10, while its lower portion rests slidably upon the lower portion of said rails. By inclining the forward portion of said side rails, the forward portion of the conveyer belt is inclined while the rear portion is horizontal or approximately so. On one end of the shaft, 19, is a sprocket wheel, 21, to receive a sprocket chain, 22, for driving the shaft, 19, and, through the latter, the conveyer belt. Said sprocket chain passes over two idle wheels, 23 and 24, and around a sprocket wheel, 25, on a counter-shaft, 26, mounted in bearings, 27, on the frame of the electric motor, 28, which motor frame is seated upon the intermediate cross-rails, 4 and 5. Power is imparted from said motor to said countershaft, 26, by means of a spur gear wheel, 29, on the motor meshing with a larger spur gear, 30, on said shaft. On each upper side rail, 10, are mounted outward-directed brackets, 31, supporting sloping side plates, 32, which form the sides of a trough of which the conveyer belt is a traveling bottom.

We now come to a description of the scoop or shovel and the mechanism for supporting and actuating the same. To the front face of each channel piece, 13, is bolted or riveted an elbow piece, 33, the upright arm of said elbow piece being directed upward. A little way below said piece, 33, is a horizontal member, 34, separated at each end from the elbow piece, 33, by spacing blocks, 35. Through the front spacing block and the adjacent ends of the member, 34, and the elbow piece, 33, passes a binding bolt, 36; and a bolt, 37, passes upward through the rear end of the member, 34, and the adjacent spacing block, 35, and is tapped into the adjacent portion of the elbow piece, 33. In this way a rectangular opening constituting a slide-way is formed for a sliding block, 38. Each such block has a groove, 39, above to receive the elbow piece and a groove, 40, below for receiving the horizontal member, 34. By this means, said blocks are effectively confined and limited to a horizontal movement parallel to the length of the machine, and such movement is without rotation of said block.

At the inner side of each member, 34, (the side directed toward the other member, 34) a rigid ear, 41, extends downward from the adjacent slide block, 38; and in each such ear is a horizontal transverse bearing, 42. A transverse horizontal shaft, 43, rests in said bearings, its ends projecting through said bearings and supporting segmental gears, 44. A rectangular bar, 45, has journals, 46, at each end extending through bearings, 47, in the slide blocks, 38, and project-

ing far enough to support segmental gears, 48, meshing with the segmental gears, 44.

The scoop or shovel, 50, is clamped to the rectangular bar, 45, by means of straps, 49.

It will now be understood that by the rotation of the shaft, 45, contra-clockwise, as viewed in Figs. 1 and 3, the nose of the shovel will be moved relatively forward and upward, or, in other words, the shovel is given a partial rotation upon the axis of said shaft, 45. But such movement is only a partial rotation limited by the extent of engagement between the segment gears, 44 and 48—approximately a half circle. When said segment gears disengage, the shovel falls back to its original position by gravity. In addition to said partial rotation upon the axis of the shaft or bar, 45, said shovel reciprocates horizontally by the reciprocation of the slide blocks, 38, whereby the shaft or bar, 45, is carried forward and backward. Said blocks are reciprocated by mechanism as follows: Adjacent one of the segment gears, 44, on the shaft, 43, at the rear of the scoop is a bevel gear, 51, surrounding said shaft; and said bevel gear meshes with another bevel gear, 52, on a telescoping shaft, 53, which is parallel to the length of the machine and rests at its front end in a bearing, 54, in the adjacent channel piece, 13, and at its rear end in a bearing, 55, and is loosely surrounded at its rear end by a bevel gear, 56, meshing with a bevel gear, 57, on a counter-shaft, 26, adjacent the electric motor, 28. A clutch, 56^a, on the shaft, 53, serves to engage the bevel gear, 56, to said shaft (Fig. 2). The bevel gear wheel, 52, and the portion of the shaft, 53, thereto attached are held in position by a bearing, 62, in a curved rearward extension of the ear, 41, on the adjacent slide block, 38. By means of said gears and telescoping shaft, the shaft is continuously rotated clockwise as viewed in Figs. 1 and 3, and with each rotation of said shaft the segment gears, 44, on said shaft engage the segment gears, 48, on the shaft or bar, 45, and impart a partial rotation to the latter, as already described. On each end of the shaft, 43, is a rigid crank, 58, the outer end of each of which is coupled at 60 to one end of a link, 59, the other end of which link is journaled at 61 to the frame of the machine. Said link is therefore free to oscillate in an upright plane with the point, 61, for a center; and said links restrain the rotation of the cranks, 58, to such extent and in such manner as to cause a reaction upon the shaft, 43, and through the latter upon the slide blocks, 38, to compel the latter to move horizontally between the horizontal members, 34, and the elbow piece, 33. In other words, said cranks tend to impart to the shaft, 43, an orbital movement as a reversal of the orbital movement of the outer ends of the cranks; but

said orbital movement is modified to a reciprocatory movement by said horizontal member, 34, and the elbow piece, 33, the oscillation of the links, 59, compensating for the absence of the orbital movement of said shaft and the consequent rotation of the outer ends of the cranks upon a fixed line. During such reciprocatory movement of the slide blocks, 38, the telescoping shaft, 53, shortens and lengthens to the extent of the reciprocation of said blocks.

The purpose of the bodily reciprocation of the scoop is to bring the nose of the scoop in front of the material beneath which the scoop is to pass. The movements are so timed as to bring the scoop to its rearward limit when the nose of the scoop reaches the low portion of its orbit, and to bring said nose to the high part of its orbit when the rear limit of reciprocation is reached, in order that the scoop may then be so tilted backward as that the material thereon will move rearward out of the scoop upon the conveyer.

Provision is also made for propelling the machine by the power of the electric motor, 28, to take the machine from one working place to another or to propel the machine forward for its work. For this purpose, a counter-shaft, 63, is seated in bearings, 64, parallel to the counter-shaft, 26, and provided with a spur gear wheel, 65, meshing with a spur gear wheel, 66, on said counter-shaft, 26. On the counter-shaft, 63, is a reversing gear member, 67, comprising two bevel gears directed toward each other, said member being keyed for sliding upon said shaft and to rotate therewith. A bell crank lever, 68, engages an annular groove, 69, on said member, 67, whereby said reversing member may be reciprocated by the operator of the machine.

A shaft, 71, is mounted in bearings, 72, parallel to the length of the machine and on the rear end of said shaft is a bevel gear, 70, standing between the bevel gears of the reversing member, 67. On the front end of said shaft is a worm, 73, which engages a worm gear wheel, 74, on the axle, 75, and said axle rests in the supporting wheels, 76, and said wheels rest on the ground or any desired form of track. The shaft, 63, and the reversing gear member, 67, receive motion from the motor, 28, and either one of the bevel gears of said member may be made to engage the bevel gear wheel, 70, or said reversing member may be put into such position as to bring the bevel gear wheel, 70, midway between the bevel gear wheels of said member and out of engagement with both. By such reversal, the machine may be propelled backward or forward as may be desired. Thus it will be seen that provision is made for the simultaneous operation of the shovel and the conveyer and the forward

movement of the machine to keep the scoop within reach of the material to be loaded.

The frame here shown as constituting the body of the machine and supported upon the ground by the wheels, 76, may be made a swinging jib applied to the front of a suitable car, so that the scoop may be given a sidewise reach for the purpose of operating over a wider area than is possible when no lateral movement is made. Such a car and jib are shown in my application Serial No. 381,624, filed in the United States Patent Office July 1, 1907.

I claim as my invention:

1. In a machine of the nature described, forward-and-rearward shiftable and turnable, power-driven supporting mechanism, a scoop immovably secured rearward of its front end to said supporting mechanism so that the scoop partakes of the forward and rearward and turning movements of said supporting mechanism, whereby the scoop is moved bodily forward and backward while the forward portion is moved through an orbit, substantially as described.

2. In a machine of the nature described, forward-and-rearward shiftable and turnable, power-driven supporting mechanism, conducting mechanism behind said supporting mechanism, a scoop immovably secured rearward of its front end to said supporting mechanism so that the scoop partakes of the forward and rearward and turning movements of said supporting mechanism, whereby the scoop is moved bodily forward and backward while the forward portion is moved through an orbit, substantially as described.

3. In a machine of the nature described, guide-ways extending forward and rearward, turnable, power-driven supporting mechanism confined in said guide-ways, a scoop immovably attached rearward of its front end to said supporting mechanism so that the scoop partakes of the forward and rearward movement and the turning of said supporting mechanism, whereby the scoop is moved bodily forward and backward while the forward portion is moved through an orbit, substantially as described.

4. In a machine of the nature described, guide-ways extending forward and rearward, turnable, power-driven supporting mechanism confined in said guide-ways, conducting mechanism behind said supporting mechanism, a scoop immovably attached rearward of its front end to said supporting mechanism so that the scoop partakes of the forward and rearward movement and the turning of said supporting mechanism, whereby the scoop is moved bodily forward and backward while the forward portion is moved through an orbit, substantially as described.

5. In a machine of the nature described,

guide-ways extending forward and rearward, slide-blocks confined in said guide-ways, a scoop secured to said slide-blocks rearward of its front portion, and mechanism for moving said slide-blocks forward and backward and turning said scoop in said blocks, substantially as described.

6. In a machine of the nature described, guide-ways extending forward and rearward, slide-blocks confined in said guide-ways, conducting mechanism behind said blocks, a scoop secured to said slide-blocks rearward of its front portion, and mechanism for moving said slide-blocks forward and backward and turning said scoop in said blocks, substantially as described.

7. In a machine of the nature described, guide-ways extending forward and rearward, slide-blocks confined in said guide-ways, a scoop secured turnably in said slide-blocks rearward of its front end, a shaft mounted in said blocks and in operative relation with said scoop for turning the latter, and power mechanism for turning said shaft, substantially as described.

8. In a machine of the nature described, forward-and-rearward shiftable and turnable supporting mechanism, a scoop immovably secured rearward of its front end to said supporting mechanism so that the scoop partakes of the forward and rearward and turning movements of said supporting mechanism, whereby the scoop is moved bodily forward and backward while the forward portion is moved through an orbit, and a motor located upon said machine and in operative relation with said supporting mechanism, substantially as described.

9. In a machine of the nature described, a scoop, a support engaging the rear portion of the scoop, said support being reciprocable parallel to the length of the machine and turnable upon an axis which is horizontal and transverse to the length of the machine, a shaft reciprocable with said support and having at each end a crank, members free for up and down movement and coupled to the free ends of said cranks, and mechanism for turning said shaft, substantially as described.

10. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, a support engaging the rear portion of the scoop, said support being reciprocable parallel to the length of the machine and turnable upon an axis which is horizontal and transverse to the length of the machine, a shaft reciprocable with said support and having at each end a crank, members free for up and down movement and coupled to the free ends of said cranks, and

mechanism for turning said shaft, substantially as described.

11. In a machine of the nature described, a scoop, guide-ways parallel to the length of the machine, a support engaging the rear portion of the scoop and resting in said guide-ways and being turnable upon an axis which is horizontal and transverse to the length of the machine, a shaft reciprocable with said support and having at each end a crank, members free for up and down movement and coupled to the free ends of said cranks, and mechanism for turning said shaft, substantially as described.

12. In a machine of the nature described, guide-ways, a scoop, conducting mechanism behind said scoop, a support engaging the rear portion of the scoop and resting in guide-ways and being turnable upon an axis which is horizontal and transverse to the length of the machine, a shaft reciprocable with said support and having at each end a crank, members free for up and down movement and coupled to the free ends of said cranks, and mechanism for turning said shaft, substantially as described.

13. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, guide-ways, slide-blocks on said ways, a support engaging the rear portion of the scoop, said support being journaled in said slide-blocks and having at each end a segment gear, a shaft parallel to said support and mounted in bearings in said slide-blocks and having gear wheels engaging said segment gears, and driving mechanism in operative relation with said shaft, substantially as described.

14. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, guide-ways, slide-blocks on said ways, a support engaging the rear portion of the scoop, said support being journaled in said slide-blocks and having at each end a segment gear, a shaft parallel to said support and mounted in bearings in said slide-blocks, and having gear wheels engaging said segment gears and having at each end a crank arm, members arranged for up-and-down movement and coupled to said cranks, and driving mechanism in operative relation with said shaft, substantially as described.

In testimony whereof I have signed my name, in presence of two witnesses, this 19th day of March, in the year one thousand nine hundred and eight.

WILLIAM WHALEY.

Witnesses:

CYRUS KEHR,
C. A. MORSE.